

Remarks

Claims 1, 3, 5, 7, 9-13, 15, 16, 18, and 20-24 are pending in the above-identified patent application. With this Response, claims 1, 3, 5, 7, 12, 13, 15, 16, 18, and 21-24 are amended; claims 9 and 20 are canceled; and new claims 25 and 26 are added. Upon entry of the current amendments, claims 1, 3, 5, 7, 10-13, 15, 16, 18, and 21-26 are pending.

It is respectfully submitted that the amendments to the application are fully supported by the application as originally filed and that such amendments do not present new matter. Support for new claims 25 and 26 can be found in the specification at, e.g., page 10, lines 22-25, and Figure 1. Claims 3, 7, 15, and 18 are merely amended to clarify claim language. Support for the remaining claim amendments is discussed below.

Applicants respectfully request reconsideration and further examination of the application in view of the amendments above and remarks below.

Interview Summary

Applicants gratefully acknowledge the telephonic interview between Examiner Rivell and Applicants' undersigned representative, Paul J. Parins, on March 22, 2007, in connection with the above-identified patent application.

Mr. Parins inquired to clarify whether claim 23 or claim 24 would be allowable if the 35 U.S.C. §112, second paragraph, rejection is overcome as indicated in the third full paragraph on page 13 of the outstanding Office Action.

Examiner Rivell clarified that claim 24 would be allowable if the 35 U.S.C. §112, second paragraph, rejection described on page 3 in the outstanding Office Action is overcome. It was noted that this is consistent with the indication in the Office Action Summary that claim 24 is objected to.

Note: as described below, claim 24 is amended to overcome the rejection under 35 U.S.C. §112, second paragraph, and is therefore considered allowed.

Fees for Adding New Claims 25 and 26

No fee is believed to be due for adding new dependent claims 25 and 26 because of claims previously paid for and subsequently canceled. However, if any fee is due for adding claims 25 and/or 26 please charge all of the appropriate fee(s) to the Kagan Binder Deposit Account No. 50-1775 and notify us of the same.

Amendments After Final

It is respectfully submitted that all of the claim amendments submitted with this response should be entered after final Office Action as the amendments include canceling claims, complying with matters of form expressly set forth in the final Office Action, and presenting the claims in better form for consideration on appeal.

Claim Rejections - 35 U.S.C. § 101

Claims 22 and 23 stand rejected under 35 U.S.C. §101 because, according to the Office Action, claims 22 and 23 do not set forth any steps.

It is respectfully submitted that this rejection is overcome by amending each of claims 22 and 23. Each of claims 22 and 23 are amended to further define the “causing” step recited in claim 21 (from which each of claims 22 and 23 depend) and to define an “introducing” step. Support for these amendments can be found in the specification at, e.g., page 18, line 7 to page 19, line 9, and Figure 8.

Accordingly, it is respectfully requested that the rejection of claims 22 and 23 under 35 U.S.C. §101 be withdrawn.

Claim Rejections - 35 U.S.C. § 112

Claims 3, 7, 9, 18, 20, 22-24 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

According to the Office Action, claims 3, 7, 9, 18, and 20 are indefinite because each of the claims depend on a canceled claim. With this Response, claims 3, 7, and 18, are amended to depend from a pending claim and claims 9 and 20 are canceled.

According to the Office Action, claims 22 and 23 are indefinite because claims 22 and 23 do not set forth any steps. As discussed above in the rejection of claims 22 and 23 under §101,

each of claims 22 and 23 are amended to clarify the “causing” step in claim 21 and to further define an “introducing” step.

According to the Office Action, claim 24 is indefinite because it is unclear which “gap” is being referred to in the claim language “wherein the gap extends along the length of the spacer....” With this Response, claim 24 is amended to clarify that the “gap” being referred to is the gap “between the spacer and the rotor.”

Accordingly, it is respectfully submitted that claims 3, 7, 9, 18, 20 and 22-24 fully comply with 35 U.S.C. §112, second paragraph, and that the rejection of claims 3, 7, 9, 18, 20 and 22-24, under 35 U.S.C. §112, second paragraph, as being indefinite be withdrawn.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 5, 9, 11, 12, 16, 20, and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. (U.S. Pat. No. 4,313,624) in view of Jen (U.S. Pat. No. 4,455,121).

It is respectfully submitted that this rejection is overcome by the amendment to each of the base claims 1, 5, and 16.

Claims 1, 5, and 16, are amended to feature rotatably coupling the rotor to the housing using at least two unlubricated bearings that are spaced apart. Support for these amendments can be found in the specification at, e.g., page 10, lines 22-24.

Including two spaced apart unlubricated bearings in a rotary union having a rotor, post, and housing is highly advantageous as such an arrangement maintains appropriate rotational stability and gaps among rotating parts. For example, the spaced apart bearings maintain the claimed annular gap surrounding the post within extremely close tolerances and throughout extremely wide temperature ranges. Maintaining such tolerances is very advantageous as it prevents parts from rubbing and generating particles which can contaminate process fluid. Moreover, using unlubricated bearings allows the bearings to be freely positioned between the rotor and housing as there is no concern of lubrication potentially contaminating process fluid. As yet another advantage, using unlubricated bearings means that preventing process fluid from contacting the bearings is unnecessary. For example, seals such as ring seal 14 in Zierden et al. is unnecessary (note: such seals can wear and be a source of contamination themselves).

Zierden et al. do not teach, motivate, or suggest, including two, spaced apart, unlubricated bearings to rotatably couple a rotor to a housing. Zierden et al. merely disclose one bearing 12 having one inner race 21, one outer race 23, and two sets of balls 12a (see Zierden et al. at col.3, lines 5-9, and Figure 2). In addition, as acknowledged in the Office Action Zierden et al. do not teach an unlubricated bearing (see Office Action at page 4, first full paragraph).

Jen fails to cure the deficiencies of Zierden et al. The Jen reference merely discloses a single bearing 56. In addition, one of skill would not be motivated to combine the teachings of Jen with the teachings of Zierden et al. The Jen reference relates to turbine nozzles in turbine engines (see Jen at col. 1, lines 5-7), whereas the Zierden et al. reference relates to a swivel cartridge for use in, e.g., a car wash apparatus (see Zierden et al. at col. 3, lines 41-53).

In addition, Applicants note that claim 12 has been amended to clarify that the rotary union in base claim 5 can be used in a much different way than the cartridge in the Zierden et al. reference. Claim 12 clarifies that process fluid can be continuously drained from the rotary union via the drain pathway for an entire time period that process fluid is transferred from a source to a rotating point of use. In contrast, Zierden et al. use a ring seal 14 to generally prevent fluid from draining through clearance 36 even though seal 14 may fail from time to time (see Zierden et al. at col. 2, lines 62-65). Support for the amendment to claim 12 can be found in the specification at page 14, line 22 to page 15, line 11, and Figure 1.

Accordingly, it is respectfully requested that the rejection of claims 1, 5, 9, 11, 12, 16, 20, and 21 under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. in view of Jen be withdrawn.

Claims 3, 7, and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. in view of Jen, as applied to claims 1, 5, 9, 11, 12, 16, 20, and 21, further in view of Katsuhiko et al. (JP-11101250).

It is respectfully submitted that this rejection is overcome by the amendment to each of the independent claims 1, 5, and 16.

Claims 3, 7, and 18, depend from claims 1, 5, and 16, respectively. As discussed above, claims 1, 5, and 16, are considered patentable over Zierden et al. in view of Jen. The Katsuhiko et al. reference fails to cure the deficiencies of Zierden et al. in view of Jen with

respect to claims 1, 5, and 16. That is, Katsuhiko et al. fail to teach, motivate, or suggest modifying Zierden et al. in view of Jen to include two, spaced apart, unlubricated bearings to rotably couple a rotor to a housing. Indeed, the Office Action merely relied on Katsuhiko et al. to show bearings made of ceramic balls and stainless steel races.

Accordingly, it is respectfully requested that the rejection of claims 3, 7, and 18 under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. in view of Jen, as applied to claims 1, 5, 9, 11, 12, 16, 20, and 21, further in view of Katsuhiko et al. be withdrawn.

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. in view of Jen, as applied to claims 1, 5, 9, 11, 12, 16, 20, and 21, and further in view of Takada (U.S. Pat. No. 5,203,592).

It is respectfully submitted that this rejection is overcome by the amendment to independent claim 5.

Claim 10 depends from claim 5. As discussed above, claim 5 is considered patentable over Zierden et al. in view of Jen. The Takada reference fails to cure the deficiencies of Zierden et al. in view of Jen with respect to claim 5. While Takada does disclose bearings 3, 102, and 116, Takada fails to teach, motivate, or suggest modifying Zierden et al. in view of Jen to include two, spaced apart, unlubricated bearings to rotably couple a rotor to a housing having a post according to claim 5.

Accordingly, it is respectfully requested that the rejection of claim 10 under 35 U.S.C. §103(a) as being unpatentable over Zierden et al. in view of Jen, as applied to claims 1, 5, 9, 11, 12, 16, 20, and 21, and further in view of Takada be withdrawn.

Claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Raley (U.S. Pat. No. 3,462,174) in view of Jen.

It is respectfully submitted that this rejection is overcome by the amendment to claim 13.

Claim 13 is amended to feature rotatably coupling the rotor to the housing using at least two unlubricated bearings that are spaced apart. Support for this amendment can be found in the specification at, e.g., page 10, lines 22-24.

Raley does not teach, motivate, or suggest, including two, spaced apart, unlubricated bearings to rotably couple a rotor to a housing. Raley merely discloses one bearing assembly 38 having one inner race 40, one outer race 41, and two sets of balls 39 (see Raley at col.3, lines 27-34, and Figure 2). Moreover, the bearing assembly 38 is lubricated (see Raley at col. 3, lines 45-54). In addition, as acknowledged in the Office Action Raley does not teach an unlubricated bearing (see Office Action at page 11, last paragraph).

Jen fails to cure the deficiencies of Raley. The Jen reference merely discloses a single bearing 56. In addition, one of skill would not be motivated to combine the teachings of Jen with the teachings of Raley. The Jen reference relates to turbine nozzles in turbine engines (see Jen at col. 1, lines 5-7), whereas the Raley reference relates to a rotatable coupling to, e.g., couple a plastic extruder to a rotating extrusion die (see Raley at col. 1, lines 12-30).

Accordingly, it is respectfully requested that the rejection of claim 13 under 35 U.S.C. §103(a) as being unpatentable over Raley in view of Jen be withdrawn.

Claim 15 is rejected under 35 U.S.C. §103(a) as being unpatentable over Raley in view of Jen as applied to claim 13, and further in view of Katsuhiko et al. (JP-11101250).

It is respectfully submitted that this rejection is overcome by the amendment to independent claim 13.

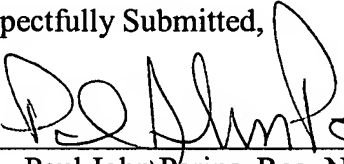
Claim 15 depends from claim 13. As discussed above, claim 13 is considered patentable over Raley in view of Jen. The Katsuhiko et al. reference fails to cure the deficiencies of Raley in view of Jen with respect to claim 13. That is, Katsuhiko et al. fail to teach, motivate, or suggest modifying Raley in view of Jen to include two, spaced apart, unlubricated bearings to rotably couple a rotor to a housing. Indeed, the Office Action merely relied on Katsuhiko et al. to show bearings made of ceramic balls and stainless steel races.

Accordingly, it is respectfully requested that the rejection of claim 15 under 35 U.S.C. §103(a) as being unpatentable over Raley in view of Jen as applied to claim 13, and further in view of Katsuhiko et al. be withdrawn.

Conclusion

Approval of the application and allowance of the claims is earnestly solicited. In the event that a phone conference between the Examiner and the Applicants' undersigned attorney would help resolve any issues in the application, the Examiner is invited to contact said attorney at (651) 275-9831.

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Respectfully Submitted,
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